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ABSTRACT

In an earlier report, one of the authors describes 28 temperament factors for which there is sufficient consensus in the literature to call them "established". From 1 to 5 distinct bipolar subscales were suggested to mark each factor; 12 or 16 item subscales were written, each balanced in terms of the two defined poles and in terms of numbers of positively and negatively stated items. This yielded a total of 1,332 items for 87 subscales as intended markers for the 28 factors. This study determines, by means of factor analyses using the newly constructed subscales, how well the 28 putative factors stand up. A total of 4,000 naval recruits were tested with a complex design that permitted determination of the correlations among all 87 subscales but that required no individual to respond to more than 320 items. A second sample of 153 female and 92 male students at the University of Oregon were given the entire battery of items. After item analyses and reliability determinations were made, 77 subscales survived. Correlation matrices were computed separately for the two samples and factor analyses performed; 22 minres factors were retrained in each sample and rotated to maximum obliqueness using the direct oblimin method. Results are discussed separately for the two samples and compared across the two. (Author/RC)

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# VERIFICATION OF SELF-REPORT TEMPERAMENT FACTORS

Diran Dermen, John W. French, and Harry H. Harman

December 1974

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Principal Investigator

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Educational Testing Service
Princeton, New Jersey

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In an earlier report of this project, French describes 28 temperament factors for which there is sufficient consensus in the literature to call them "established". From 1 to 5 distinct bipolar subscales were suggested to mark each factor. Using these descriptions as a guide, 12 or 16 item subscales were written, each balanced in terms of the two defined poles and in terms of numbers of positively and negatively stated items. This effort yielded a total of 1332 items for 87 subscales as intended markers for the 28 factors.

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The specific objective of the present study is to determine, by means of factor analyses using the newly constructed subscales, how well the 28 putative factors stand up. To this end a sample of 4000 recruits at the Navy Training Center in San Diego were tested with a complex design that permitted determination of the correlations among all 87 subscales but that required no individual to respond to more than 320 items. For further substantiation a second sample of 153 female and 92 male college students at the University of Oregon were given the entire battery of items. After item analyses and reliability determinations were made, 77 subscales survived. Correlation matrices were computed separately for the two samples and factor analyses performed. 22 minres factors were retained in each sample and rotated to maximum obliqueness using the direct oblimin method. Results are discussed separately for the two samples and compared across the two. Factors were confirmed for Self-Confidence, Open-Mindedness, Emotional Self-Sufficiency, Individualism, Gregariousness, Tolerance of Human Nature, Meticulousness, Calmness, Emotional Maturity, Thoughtfulness, and Alertness.

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Verification of Self-Report Temperament Factors

Diran Dermen, John W. French, and Harry H. Harman

## Introduction

This report is part of a general study of Reference Measures for Cognitive and Noncognitive Factors. After the general study had been under way for a while, it became clear that "noncognitive" was both too broad and too vague a concept. The more limited "temperament" domain much more appropriately describes the area of concern.

In an earlier report (PR 73-29) of this project, French describes 28 temperament factors for which there is sufficient consensus in the literature to call them "established." The criterion employed was that the factor be identifiable in at least three analyses performed by at least two independent investigators. It suggests and describes one to five subscales that might be used as marker variables for the factors. Using these descriptions as a guide, 12- or 16-item subscales were written, each balanced in terms of the two defined poles and in terms of numbers of positively and negatively stated items. This effort yielded a total of 1332 items for 87 subscales.

The specific objective of the present study is to try to verify the temperament factors identified in the literature search by means of the newly constructed items for the hypothesized scales. In essence, this study follows a combined strategy of scale construction that has been labeled by Goldberg (1972) as "intuitive-rational" and "internal-factor analytic." The actual scale construction was intuitive-rational in that items were written and keyed specifically to measure certain components of traits

(established factors) from the literature review. If, then, the resulting subscales be thought of as items, the strategy becomes internal-factor analytic in that the ultimate determination of the keying of the marker subscales depends on the internal structure of the matrix analyzed. In this instance, of course, we have strong expectations as to what the internal structure should be.

## Method

### Experimental Design

A careful design had to be planned to keep the total number of testing sessions at a reasonable level while making certain that the total number of items per session was not too large. Such a complex design will be described in which the 87 subscales were assigned to 30 overlapping booklets so that each one could be administered in a 100 minute session and still make possible the determination of the relationships among all subscales. In addition, it was decided to randomize the self-report personality items in order to minimize runs of items for particular scales and hopefully the transparency of the scales. A combination of a formal statistical design and computer-aided construction of the instruments enabled us to reach these objectives effectively.

The most expedient thing to do was to adapt a 25 x 30 experimental design that had been worked out formally in the statistical literature. It required that five of the 25 "elements" be given to each of the 30 samples, while each element appeared in six different samples, so that comparisons among all pairs could be made. However, this meant that the 28 putative factors had to be forced into 25 elements, which are

designated as "factors" for simplicity only. By combining the three reputed factors (Alertness, Concentration, and Meticulousness) that had only one subscale each with those that had two or three subscales, it was possible to constitute the 25 "factors" so that no one of these contained more than five subscales or a total of 80 items. Theoretically, this could have led to as many as 400 items in a single testing session. However, in practice, no individual was faced with more than 320 items, including the 20-item desirability (Dy) scale from Jackson's (1965) Personality Research Form.

The resulting experimental design is shown in Figure 1. A different booklet (B) was planned for each of the 30 samples, and in it were covered five different factors (F). In addition, the desirability scale was included in every booklet. Each factor, in turn, appeared in six different booklets. Thus, much larger samples were available for item statistics and other "within-factor" analyses than for the intercorrelations among subscales for different factors.

The compilation of the booklets offered some interesting challenges. The self-report personality items could not be listed in the order in which they were constructed without making apparent the intent of a hypothesized marker scale. Hence, the 16 (sometimes only 12) items of such a scale were given identifying tags that enabled us to intersperse them with items of other scales in a booklet and still recover the original scale items for

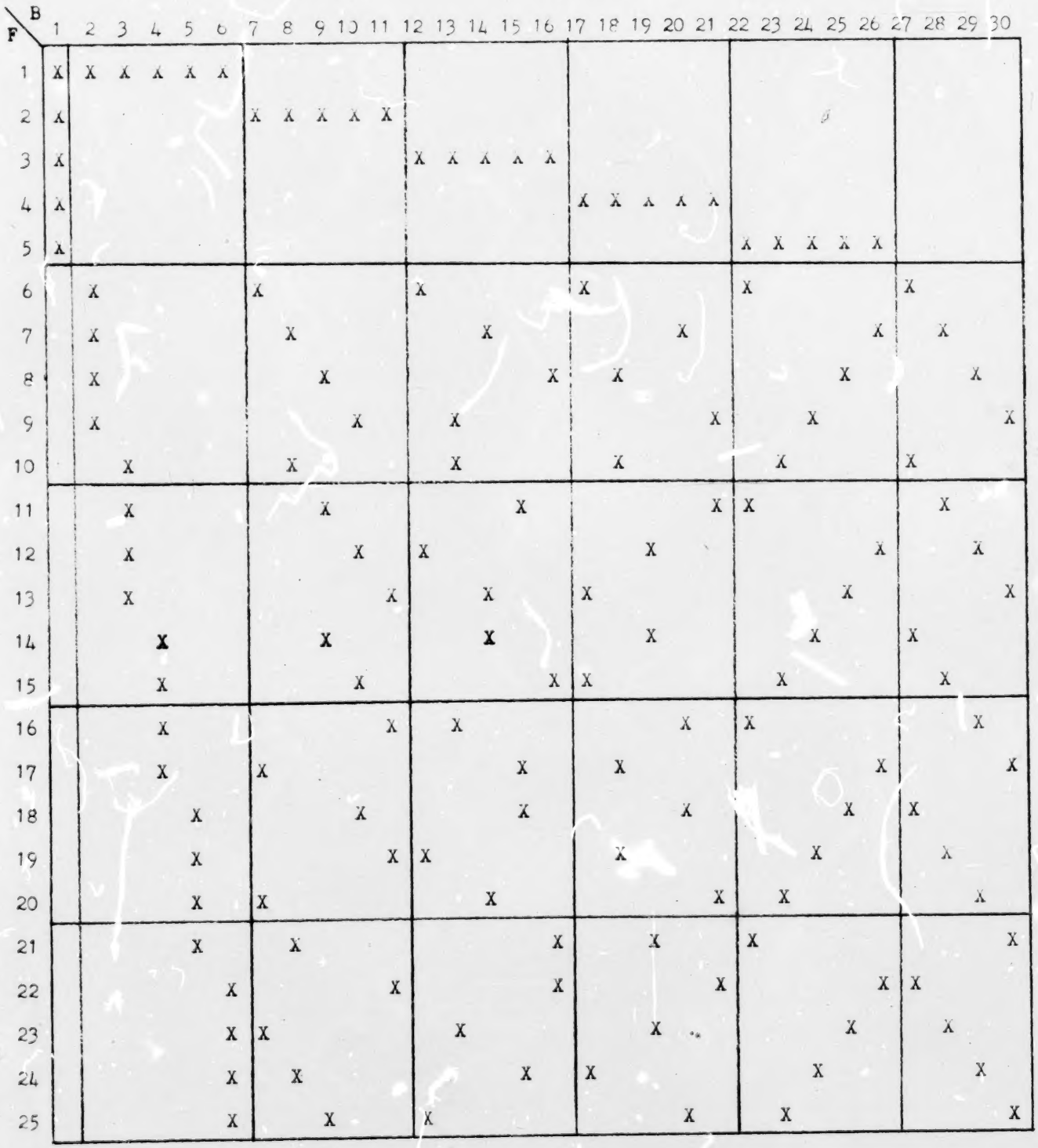


Fig. 1 --- Experimental Design

scoring. This was accomplished by giving each item a 5-digit tag, as follows:

| Digit | Information |
|---|---|
| 1st | Writer (2 distinguished) |
| 2nd-3rd | Factor (25 "factors" plus Dy scale) |
| 4th | Subscale (1-5 per factor) |
| 5th | Key number (4 or 8 per subscale) |

The individual items were given such identifying numbers with the fifth digit being the crucial one. By choice of the last number the keying of the items became automatic. The scheme for accomplishing this is exhibited in the following chart. It will be noted that an item falls into one of four basic categories depending on whether it is stated

| Key number | Key Y | Key N | Statement | Pole |
|---|---|---|---|---|
| 1 or 5 | 0 | 1 | N | P |
| 2 or 6 | 1 | 0 | P | P |
| 3 or 7 | 0 | 1 | P | N |
| 4 or 8 | 1 | 0 | N | N |
| Even numbers | 1 | 0 | (PP or NN) | |
| Odd numbers | 0 | 1 | (NP or PN) | |
| Positive statement = 2 and 3 (or 6 and 7) | | | | |
| Negative statement = 1 and 4 (or 5 and 8) | | | | |
| Positive Pole = 1 and 2 (or 5 and 6) | | | | |
| Negative Pole = 3 and 4 (or 7 and 8) | | | | |

positively or negatively and whether it refers to the positive or negative pole. Key numbers are assigned to these four categories in such a manner that the responses can be scored merely from the knowledge that it is either

an even or odd number. Thus, if an item is stated positively and refers to the positive pole it is assigned the key number "2" (or "6" if it is the second such item by the same author for the same factor and subscale), and if a subject responds "Yes" he gets a credit. Similarly, if an item is stated positively for the negative pole it is assigned the key number "3" (or "7") and a subject gets credit if he responds "No."

After all the items were assigned such identifying numbers they were put in machine-readable form so that the computer could be used in making up the 30 booklets. The experimental design of Figure 1 was also read into the computer and a program was written to make appropriate assignments of factors (with their subscales and associated items) to the 30 booklets. For each booklet the five factors plus the Dy scale (which is also called a "factor" to simplify the discussion) were randomly ordered from 1 to 6 and the items assigned as follows:

a. The first available item was taken from the factor designated as number one.

b. The next available item was taken from a random selection of the remaining five factors.

c. The next available item was taken from a random selection of the remaining four factors.

d. The next available item was taken from a random selection of the remaining three factors.

e. The next available item was taken from a random selection of the remaining two factors.

f. Select the next available item from the sixth factor.

g. Excluding the sixth factor, randomly select one of the remaining five factors and take the next available item.

h. Continue with steps b - f.

i. The above steps were repeated until all items were exhausted.

The foregoing process led to a completely random order of appearance of the items in each booklet, and the computer assigned the items serial numbers from 1 to the maximum number (which varied) in the booklet. At the same time, the computer kept track of the identifying tags for the items and prepared a dictionary of transformation from the arbitrary serial numbers to the key numbers so that the scoring could be accomplished automatically when the responses to the serially numbered items became available.

Samples

The sample of primary interest consists of some 4,000 recruits at the Navy Training Center at San Diego. Of course, this number was broken down into 30 subsamples as required by the experimental design of Figure 1. This provides an N well in excess of 700 for the analysis of any given factor, with its subscales and individual items. However, for correlations between subscales as markers of different factors, the N is limited to a single day's sample, which was never less than 102.

It had been intended to administer the items in the usual fashion but it was discovered in the first session that a sizable proportion of the men could not read sufficiently well to finish the booklet in the available time. The decision was made to read all questions aloud. Thus, individual differences in reading ability were eliminated--but differences in listening ability or attention were introduced. Of course,

comprehension of the meanings of the items is still a problem.

A second sample was obtained from the University of Oregon through the courtesy of Lewis R. Goldberg. It consists of 153 female and 92 male college students. In this case the entire inventory, randomly arranged in two booklets, was administered in the usual fashion without time constraints. Presumably, differences in verbal comprehension of the test items are minimal in this sample.

Analyses of Items and Subscales

Basic item analyses were done with the responses from the Navy sample. For this purpose, a random sample of 400 cases who had omitted no items was selected for each marker scale. If an item did not meet some minimum psychometric conditions it was eliminated from further consideration. Thus, an item was dropped if the proportion "passing" it was less than .10 or greater than .90. Also, if an item-subscale biserial correlation was less than .15, the item was dropped. In addition, items were eliminated when necessary to have an equal number of "yes" and "no" keyed items (deleting the next worst item, with biserial greater than .15, in order to maintain the balance).

A review of the subscales was made after items were deleted. Certainly, no scale with fewer than six items would be recommended as a marker for a factor. However, for purposes of the subsequent factor analyses that might throw some light on the make-up of the factors, it was decided to retain three subscales that had only four items each. Reliabilities (coefficient alpha) were obtained for the refined sub-

scales, using the remaining cases from the total Navy sample. Refined subscales with reliabilities less than .35 were dropped. Ten subscales were dropped on the basis of the item analyses and scale requirements.

The 77 remaining subscales contain from 4 to 16 items each for a total of about 1,000 items; their reliabilities (see Table C of the Appendix) range from .35 to .79. Scoring of the responses of the college sample, as well as the Navy sample, was based on the revised keys from the item analyses of the responses of the Navy subsample. Descriptions of the 77 intended markers, their abbreviations, and variable numbers are presented in Table 1.

Factor Analyses

The basic strategy in using factor analysis was to explore the extent to which the items and subscales constructed to mark the 28 putative factors found in the literature actually accomplished the objective. The principal verification was planned for the Navy recruit sample, while substantiation of the results would come from the college student sample. Correlations among the 77 variables, and with the desirability scale, were computed separately for the two samples. In addition, correlations with the sex variable were obtained in the college sample.

It was decided that neither the desirability scale nor sex should be permitted to influence the determination of the factor structures. Instead, the factor solutions for the 77 subscales would be extended to cover these variables. The characteristic roots of the two correlation matrices were computed to note how many were greater than one. Also, the roots were plotted so that the scree test could be applied. This

TABLE 1

| Variable Code No. | | Factor and Subscale Description |
|---|---|---|
| Ac | | General Activity |
| Ac(A) | 1 | Moves rapidly, quick in physical performance vs. slow |
| Ac(B) | 2 | Busy, active in projects or nonsocial affairs vs. uninvolved, feels overburdened |
| Ac(C) | 3 | Accomplishes things rapidly vs. indolent, unmotivated |
| Ag | | Agreeableness |
| Ag(A) | 5 | Interested in people's welfare, friendly vs. prefers lone intellectual contributions |
| Ag(D) | 7 | Trustful, confides in people vs. suspicious, keeps distance |
| Ag(E) | 6 | Friendly, likeable, outgoing vs. aloof, unpleasant, withdrawn |
| Al | | Alertness |
| Al(A) | 4 | Alert to immediate surroundings, attentive vs. unaware, engrossed, absent-minded |
| Au | | Autistic Tendency |
| Au(A) | 8 | Daydreams vs. has practical thoughts |
| Au(B) | 9 | Anxiety leading to autistic thinking vs. relaxed, adjusted, realistic thoughts |
| Ca | | Calmness vs. Anxiety |
| Ca(A) | 10 | Relaxed, at ease vs. anxious, worried about self, edgy, nervous, tense, restless |
| Ca(B) | 11 | Takes time to think, deliberate vs. overreacts, impulsive, jittery |
| Ca(C) | 12 | Confident or optimistic about world vs. fears or worries about outside influences |
| Co | | Concentration |
| Co(A) | 55 | Concentrates on study or reading vs. mind wanders, bored, forgets names |
| De | | Dependability |
| De(B) | 20 | Dependable, punctual, keeps promises vs. careless about promises and details |
| De(C) | 21 | Self-sentiment control, control of feelings vs. actions, thoughts swayed by emotions |
| De(-) | 22 | Conscientious, scrupulous vs. careless about doing what is right |
| Do | | Dominance |
| Do(A) | 13 | Takes charge socially, wants power vs. submissive, willing to serve |
| Do(B) | 14 | Egoistic, pushes own ideas vs. respects others' ideas, self-effacing |
| Do(C) | 15 | Rights-conscious, complaining vs. tolerant |
| Em | | Emotional Maturity |
| Em(A) | 23 | Patient, adjusts to frustration vs. verbally aggressive, demanding |
| Em(B) | 24 | Modest, shuns attention, outwardly directed vs. seeks attention, egotistical |
| Em(C) | 25 | Satisfied, cooperates with authority vs. asserts independence from authority, stubborn |
| Es | | Emotional Stability |
| Es(A) | 16 | Emotionally stable, tolerant, stolid vs. emotionally sensitive, irritable |
| Es(B) | 17 | Optimistic, faces problems vs. worrying, dwells on problems, escapist |
| Es(C) | 18 | Healthy, feels vigorous vs. tired, intermittent loss of energy, hypochondriacal |
| Es(D) | 19 | Life is good, life is worthwhile vs. feels frustrated, dissatisfied |
| Gs | | Gregariousness |
| Gs(A) | 26 | Likes to be with people physically vs. likes to be alone |
| Gs(C) | 27 | Likes work or socializing with people vs. likes work alone or isolated activities |
| Me | | Meticulousness |
| Me(A) | 34 | Meticulous, orderly, neat, particular about personal effects vs. messy, careless |
| Mo | | Morality |
| Mo(A) | 29 | Law-abiding, obedient, well-mannered, patriotic vs. free, progressive, liberal |
| Mo(B) | 28 | Moral, knows right from wrong, resists temptation vs. pleasure seeking |
| Mo(C) | 30 | Generous, helpful, fair, gives to causes vs. selfish, uncharitable |
| Na | | Need for Achievement |
| Na(A) | 35 | Likes to do his best, works hard, persists until successful vs. play before work |
| Na(B) | 36 | Likes success in competition, likes getting ahead vs. dislikes competition |
| Na(C) | 37 | Strives for accomplishment vs. no motivation to do good or to help people |
| Ob | | Objectivity vs. Paranoid Tendency |
| Ob(A) | 38 | Objectivity and fairness attributed to others vs. paranoid delusions about others |
| Ob(B) | 39 | Credit is given by others vs. blame by others is unfair |
| Ob(C) | 40 | Depends on others for help, advice, sympathy vs. not interested in others, independent |

TABLE 1 (cont.)

| Variable Code No. | | Factor and Subscale Description |
|---|---|---|
| Om | | Open-Minded vs. Authoritarian |
| Om(A) | 41 | Many philosophies, religious, political views reasonable vs. only one possible |
| Om(B) | 42 | Respect for philosophies of others vs. belief in rightness or wrongness of principles |
| Om(C) | 43 | Innovative, ready for new ideas, flexible vs. conservative, conventional, unchangeable |
| Pe | | Persistence |
| Pe(A) | 31 | Persistent, persevering, determined vs. quitting, needs change, gets discouraged |
| Pe(B) | 33 | Likes stable tasks, interests stable vs. likes changing tasks, interests change |
| Pe(C) | 32 | Conscientious, careful, exacting, tidy, orderly vs. relaxed, carefree, nonchalant |
| Po | | Poise vs. Self-Consciousness |
| Po(A) | 44 | Enjoys group attention, exhibitionistic, poised vs. dislikes being in front of people |
| Po(B) | 45 | Enjoys performing in public, likes speaking to group vs. dislikes performing in public |
| Po(C) | 46 | Seeks comment from important people vs. self-conscious with superiors, avoids criticism |
| Re | | Relaxed vs. Nervous |
| Re(A) | 53 | Physically relaxed vs. fidgets, has nervous habits, twitches, has restless movements |
| Re(B) | 54 | Tolerant of nonhuman or situational annoyances vs. irritated by mishaps, frustrations |
| Rt | | Restraint vs. Rhathymia |
| Rt(A) | 56 | Planning vs. acting without thought, impulsive |
| Rt(B) | 57 | Serious, responsible vs. lively, carefree, irresponsible, no thought of the future |
| Rt(C) | 58 | Enjoys stable pursuits vs. wants excitement, change, wildness |
| Sc | | Self-Confidence |
| Sc(A) | 59 | Feels confident vs. needs encouragement, feels inferior, afraid of failure |
| Sc(B) | 60 | Claims abilities, skills, good experiences vs. claims handicaps, ineptitude |
| Sc(C) | 61 | Sees others as positive toward him vs. sees others as negative toward him |
| Se | | Sensitive Attitude |
| Se(A) | 47 | Warm, soft, cooperative, kind considerate vs. hard, stern, bossy |
| Se(C) | 48 | Interest in people's welfare, religion vs. interest in people for companionship or fun |
| So | | Sociability |
| So(A) | 70 | Competent socially, social organizer vs. withdrawn, fears public speaking |
| So(B) | 71 | Glib talker, superficial social know-how vs. aloof, doesn't know what should be said |
| So(C) | 72 | Experienced or confident in social contacts vs. shy, socially insecure |
| Ss | | Self-Sufficiency |
| Ss(A) | 49 | Self-sufficient, likes to be alone in stress, planning vs. dependent, needs others |
| Ss(B) | 50 | Desires to be different, individualistic, free vs. needs approval, conforms |
| Ss(C) | 51 | Unconventional, idealistic vs. tends to have same feelings as others, majority opinions |
| Ss(D) | 52 | Emotionally independent vs. needs love, friends, succorance, and protection |
| Su | | Surgency vs. Repression |
| Su(A) | 73 | Exuberant, enthusiastic, cheerful vs. repressed, reserved, inhibited |
| Su(B) | 74 | Likes to stimulate and cheer up people vs. quiet, stay-at-home |
| Th | | Thoughtfulness |
| Th(A) | 62 | Likes to reflect, meditate vs. prevented from doing it by social or business activity |
| Th(B) | 63 | Likes to think about people vs. enjoys the company of people without analyzing them |
| Th(C) | 64 | Thinks about self vs. carefree about self |
| Th(D) | 65 | Intellectual interests vs. active interests |
| To | | Tolerance of Human Nature and Things vs. Criticalness |
| To(A) | 66 | Naive, believes people honest and fair vs. believes people are unfair to gain advantage |
| To(B) | 67 | Believes people are capable of good work vs. critical, fault finding |
| To(C) | 68 | Tolerant of human nature vs. cynical about human nature |
| To(E) | 69 | Tolerate imperfections in things vs. feels hostility toward things that fail to work |
| Wb | | Well-Being vs. Depression |
| Wb(A) | 75 | Has feeling of well-being, happy vs. depressed, blue, lonely |
| Wb(B) | 76 | Hopeful, optimistic about own future vs. fear and worry about doom or vague dangers |
| Wb(C) | 77 | Confident, can stand criticism vs. guilt prone, feels worthless, worries about himself |
| Dy | 78 | Desirability |
| Sex | 79 | Female sex |

suggested that 22 or 23 factors be retained in the Navy sample and, because of some uncertainty, that 19, 22, or 25 factors be tried in the college sample.

Minres factor analyses were performed for all five instances listed above. Transformations to maximally oblique solutions were obtained by using the direct oblimin method (Harman, 1967, p. 336) with deltas of .45. Comparisons of these results within each sample led to the decision to retain the 22-factor solutions in both instances. Results in the two samples will be presented and discussed separately, then compared with each other and with the findings in the literature.

## Results

### Sample 1 (Navy Recruits)

The factor pattern coefficients and correlations among the factors for the Navy sample are presented in Tables 2 and 3 (the factor structure correlations for the two samples are presented in the appendix, Tables A and B).

Six of the 22 factors (factors 6, 11, 14, 15, 19, and 20), each having only one factor pattern weight over .30, are judged to be specifics describable by a single subscale. These "specific" factors and other relatively small factors not readily interpretable in terms of the hypothesized factors will, with a few exceptions, not be discussed.

Factor 1 is the largest factor in the matrix, with 18 of the 77 variables appearing with sizable weights, including markers intended for 9 of the

TABLE 2

FACTOR PATTERN--NAVY SAMPLE

| Subscale | Factor | | | | | | | | | | | | | | | | | | | | | | $h^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |
| 1 Ac(A) | | | | | | | | | | | | | | | | | | | | | 76 | | 54 |
| 2 Ac(B) | | | | | | | | | | | | | | | | | | | | | 59 | | 60 |
| 3 Ac(C) | | | | | | | | | | | | | | | | | | | | | 75 | | 89 |
| 4 Al | 35 | | | | | | | | | | | | | | | | | | | | | | 54 |
| 5 Aq(A) | | | | | | | | | | | | 34 | | | | | | | | | | 39 | 76 |
| 6 Aq(E) | | | | | | | | | | | | | | | | | | | | | | | 60 |
| 7 Aq(D) | | | | | | | | | | | | | | | | 45 | | | | | | | 59 |
| 8 Au(A) | 51 | | | | | | | | -30 | | | | | | | | | | | | | | 59 |
| 9 Au(B) | -79 | | | | | | | | | | | | | | | | | | | | | | 100 |
| 10 Ca(A) | 92 | | | | | | | | | | | | | | | | | | | | | | 86 |
| 11 Ca(B) | 72 | | | | | | | | | | | | | | | | | | | | | | 74 |
| 12 Ca(C) | 38 | | | | | | | | | 44 | | | | | | | | | | | | | 58 |
| 13 Do(A) | | 42 | | | | | | | | | | | | | | | | | | | | | 68 |
| 14 Do(B) | | 35 | | | | | | | | | | | 70 | | | | | | | | | | 89 |
| 15 Do(C) | | | | | | | 105 | | | | | | | | | | | | | | | | 100 |
| 16 Es(A) | 94 | | | | | | | | | | | | | | | | | | | | | | 86 |
| 17 Es(B) | 30 | | | | | | | | | | | | | | | | | | | | | | 74 |
| 18 Es(C) | | | | | | | | | | | | | | | | 32 | | | | | 31 | | 87 |
| 19 Es(D) | | | | | | | | | | | | | | | | 31 | | | | | | | 83 |
| 20 De(B) | 52 | | | | | | | | | | | | | | | | | | | | | | 74 |
| 21 De(C) | 74 | | | | | | | | | | | | | | | | | | | | | | 66 |
| 22 De(-) | 33 | | | | | | | | | | | | | | | | | | | | 30 | | 73 |
| 23 Em(A) | 52 | | | | | | | | | | | | | | | | | | | | | | 71 |
| 24 Em(B) | | | | | | | | | | | 92 | | | | | | | | | | | | 100 |
| 25 Em(C) | | | | | | | | | | | | | | | | 49 | | | | | | | 82 |
| 26 Gs(A) | | | | | | | | | | | | 58 | | | | | | | | | | | 76 |
| 27 Gs(C) | | | | | | | | | | | | 79 | | | | | | | | | | | 82 |
| 28 Mo(B) | | | | | | | | | 96 | | | | | | | | | | | | | | 100 |
| 29 Mo(A) | | | | | | | | | | | | | | | | | 54 | | | | 46 | | 67 |
| 30 Mo(C) | | | | | | | | | | | | | | | | | | | 75 | | | | 86 |
| 31 Pe(A) | | | | | | | | | | | | | | | | | | | | | 80 | | 73 |
| 32 Pe(C) | | | | | | | | | | | | | | | | | | | | | 74 | | 73 |
| 33 Pe(B) | | | | | | | | | | | | | | | | | | | | 109 | | | 100 |
| 34 Me | | | | | | | | | | | | | | | | | | | | | 60 | | 69 |
| 35 Na(A) | | | | | | | | | | | | | | | | | | | | | 68 | | 79 |
| 36 Na(B) | | | | | | | | | | | | | | | | | | | | | 71 | | 79 |
| 37 Na(C) | | | | | -37 | | | | | | | | | | | | | 52 | | | | | 90 |
| 38 Ob(A) | | | | | | | -41 | | | | | | | | | | | | | | 33 | | 79 |
| 39 Ob(B) | | | | | | | | | | | | | | | | | | | | | | | 69 |
| 40 Ob(C) | | | | | | | | | | | | 32 | | | | | | | | | | | 64 |
| 41 Om(A) | | | | | | | | | | | | | | | | 89 | | | | | | | 84 |
| 42 Om(B) | | | | | | | | | | | | | | | | 87 | | | | | | | 71 |
| 43 Om(C) | | | | | | | | | | | | | | | | 55 | | | | | | | 57 |
| 44 Po(A) | | 88 | | | | | | | | | | | | | | | | | | | | | 91 |
| 45 Po(B) | | 83 | | | | | | | | | | | | | | | | | | | | | 90 |
| 46 Po(C) | | 48 | | | | | | | | | | | | | | | | | | | | | 49 |
| 47 Se(A) | | | | | | | | | | | | | | | | 43 | | | | | | 32 | 69 |
| 48 Se(C) | | | | | | | | | | | | | | | | | | | | | | | 54 |
| 49 Ss(A) | | | 90 | | | | | | | | | | | | | | | | | | | | 94 |
| 50 Ss(B) | | | | | 96 | | | | | | | | | | | | | | | | | | 92 |
| 51 Ss(C) | | | | | 44 | | | | | | | | | | | | | | | | | | 40 |
| 52 Ss(D) | | | 67 | | | | | | | | | | | | | | | | | | | | 70 |
| 53 Re(A) | 82 | | | | | | | | | | | | | | | | | | | | | | 84 |
| 54 Re(B) | 34 | | | | | | -41 | | | | | | 36 | | | | | | | | | | 83 |
| 55 Co | 40 | | | | | | | | | | | | | | | | | | | | | | 79 |
| 56 Rt(A) | | | | | | | | | 30 | | | | | | | | | -31 | | | | | 70 |
| 57 Rt(B) | | | | 40 | | | | | | | | | | | | | | | | | | | 65 |
| 58 Rt(C) | | | | | | | | | 33 | 31 | | | | | | | | | | | | | 77 |
| 59 Sc(A) | | 33 | | | | | | 53 | | | | | | | | | | | | | | | 85 |
| 60 Sc(B) | | | | | | | | 71 | | | | | | | | | | | | | | | 89 |
| 61 Sc(C) | | | | | | | | 53 | | | | | | | | | | | | | | | 81 |
| 62 Th(A) | | | | 37 | | | | | | | | | | | | | | | | | | | 68 |
| 63 Th(B) | | | | | | | | | | | | | | | | | | | | | | | 53 |
| 64 Th(C) | | | | 105 | | | | | | | | | | | | | | | | | | | 100 |
| 65 Th(D) | | | | | | 105 | | | | | | | | | | | | | | | | | 100 |
| 66 To(A) | | | | | | | | | | 81 | | | | | | | | | | | | | 71 |
| 67 To(B) | | | | | | | | | | | | | | | | | 31 | | | | | | 47 |
| 68 To(C) | | | | | | | | | | | | | | | | 67 | | | | | | | 62 |
| 69 To(E) | | | | | | | | | | | | | | | | | | | | | | 47 | 70 |
| 70 So(A) | | 72 | | | | | | | | | | | | | | | | | | | | | 86 |
| 71 So(B) | | 68 | | | | | | | | | | | | | | | | | | | | | 87 |
| 72 So(C) | | 84 | | | | | | | | | | | | | | | | | | | | | 88 |
| 73 Su(A) | | | | | | | | | | | | | | 76 | | | | | | | | | 100 |
| 74 Su(B) | | | | | | | | | | | | | | | 96 | | | | | | | | 100 |
| 75 Wb(A) | 48 | | | | | | | | | | | | | | | | | | | | | | 84 |
| 76 Wb(B) | 36 | | | | | | | | | | | | | | | | | | | | | | 83 |
| 77 Wb(C) | 60 | | | | | | | | | | | | | | | | | | | | | | 70 |
| 78 Dy | 30 | 08 | 02 | 10 | -06 | -03 | -11 | 17 | 04 | 08 | -02 | 01 | 05 | 14 | -01 | 26 | 01 | 02 | -01 | -07 | 15 | -05 | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |

Note. Decimal points omitted; weights $\geq$ .30 listed.

TABLE 3

FACTOR CORRELATIONS: NAVY SAMPLE

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100 | 35 | 12 | 07 | -19 | 28 | -32 | 24 | 26 | 27 | 07 | 19 | 19 | 25 | -15 | 44 | 05 | -08 | 09 | -15 | 56 | 12 |
| 2 | | 100 | -09 | 10 | -20 | 19 | -01 | 17 | 11 | 14 | -14 | 36 | 16 | 27 | 14 | 21 | -02 | 01 | 22 | -23 | 37 | 08 |
| 3 | | | 100 | -02 | 23 | 08 | 03 | 02 | 15 | -05 | 00 | -21 | -03 | -01 | -05 | -12 | 02 | -05 | -01 | 13 | 05 | -02 |
| 4 | | | | 100 | 02 | 23 | -06 | -13 | 24 | 05 | 13 | 10 | 06 | -01 | -03 | 12 | -01 | 09 | 02 | -02 | 18 | 07 |
| 5 | | | | | 100 | -02 | 08 | -04 | -21 | -14 | -08 | -20 | 01 | -08 | 07 | -13 | -07 | 14 | -03 | 03 | -27 | -16 |
| 6 | | | | | | 100 | -14 | -07 | 26 | 15 | -01 | 07 | 11 | 00 | 02 | 26 | -06 | -01 | -01 | -03 | 22 | 08 |
| 7 | | | | | | | 100 | 01 | 02 | -21 | -19 | -03 | -01 | -06 | 13 | -36 | -06 | 06 | 02 | 21 | -24 | -14 |
| 8 | | | | | | | | 100 | -04 | 03 | 05 | 07 | 05 | 07 | 08 | 14 | 03 | -02 | -08 | -14 | 19 | -05 |
| 9 | | | | | | | | | 100 | 13 | 04 | 05 | 03 | 00 | -07 | 09 | 05 | -03 | 02 | 09 | 35 | 09 |
| 10 | | | | | | | | | | 100 | 10 | 17 | 10 | 14 | 06 | 25 | 03 | -02 | -03 | 03 | 25 | 16 |
| 11 | | | | | | | | | | | 100 | 06 | 02 | -06 | -18 | 05 | 00 | 00 | -03 | 06 | -04 | 00 |
| 12 | | | | | | | | | | | | 100 | 05 | 23 | -01 | 1 | 06 | -04 | 08 | -13 | 18 | -06 |
| 13 | | | | | | | | | | | | | 100 | 04 | 01 | 12 | 01 | 02 | -05 | -02 | 16 | 04 |
| 14 | | | | | | | | | | | | | | 100 | 07 | 14 | 05 | -03 | 03 | -08 | 20 | 04 |
| 15 | | | | | | | | | | | | | | | 100 | 06 | -05 | 07 | 02 | -09 | 01 | -01 |
| 16 | | | | | | | | | | | | | | | | 100 | 04 | 03 | 03 | -28 | 45 | 08 |
| 17 | | | | | | | | | | | | | | | | | 100 | -04 | 04 | -07 | 05 | 05 |
| 18 | | | | | | | | | | | | | | | | | | 100 | 04 | -06 | -02 | -03 |
| 19 | | | | | | | | | | | | | | | | | | | 100 | -09 | 06 | 01 |
| 20 | | | | | | | | | | | | | | | | | | | | 100 | -15 | 03 |
| 21 | | | | | | | | | | | | | | | | | | | | | 100 | 23 |
| 22 | | | | | | | | | | | | | | | | | | | | | | 100 |

Note. Decimal points omitted.

28 putative factors. Most of the traits that one might associate with neuroticism or anxiety are represented including all of the subscales for autistic tendency (Au), calmness (Ca), dependability (De), relaxed vs. nervous (Re), and well-being (Wb). It looks like it corresponds to the commonly found second-order factor of Neuroticism. This factor has the largest weight for the desirability scale.

Factor 2 is a fusion of subscales for Social Poise (Po) and Sociability (So). All of the intended markers for the two traits appear on the factor. It reflects enjoyment of attention as well as social competence and social confidence. The negative end of the factor appears to be self-consciousness or shyness; perhaps aloofness.

Factors 3 and 5 reflect separate aspects of what had been originally conceived of as Self-Sufficiency (Ss). Factor 3 is a kind of emotional Self-Sufficiency, an ability and inclination to cope with problems alone. Factor 5 reflects a kind of individualism perhaps also characterized by the terms "nonconformity" and "unconventionality." The two factors are only slightly correlated ($r$ = 23).

Factor 4 is marked primarily by one variable, ThC, thinking about self vs. carefree about self. Serious vs. carefree (ThA) and reflectiveness (RtB) also appear. The term "introspective thoughtfulness" seems to apply.

Factor 7, defined mostly by DoC, rights-conscious, complaining vs. tolerant, has a strong flavor of tolerance but none of its intended markers.

Factor 8 is a clear factor of Self-Confidence (Sc). All three of the self-confidence markers appear.

MoB, moral vs. pleasure-seeking, has the only major loading on factor 9. The three additional variables with marginal loadings fit that same description.

Factor 12 is Gregariousness with both Gs subscales that survived the item analyses appearing with substantial weights.

Factor 16 is marked by all three of the Open-Mindedness (Om) markers as well as several others that are consonant with an "open-minded vs. dogmatic" interpretation. It also has some flavor of tolerance.

Factor 21 is, like factor 1, a broad factor, this time incorporating markers for general activity (Ac), persistence (Pe), meticulousness (Me), and need for achievement (Na). One is hard pressed to think of a single term or phrase to cover its components.

Table 3 presents the correlations among the factors in the Navy sample. Factors 1, 16, 21, and, to a lesser extent 2, are substantially intercorrelated. These are the four largest factors and also the four most highly correlated with the desirability scale. Correlations of the factors with the desirability scale are shown in the factor structure matrix (Table A). It is apparent that a substantial amount of the intercorrelation of these four factors may be explainable in terms of their shared desirability component. This result also raises the possibility that it is this same desirability component that accounts for the fusions that occurred in factors 1 and 21, and perhaps 2. The remaining substantial

correlations among factors are readily accounted for by content similarities.

The relative magnitude of the factor structure correlations with the desirability scale (ranging as high as .70) as contrasted with the magnitude of the factor pattern coefficients for the same variable (the highest being only .30) may need explanation. Pattern coefficients can be likened to regression weights used to predict the variables from the factors. Because desirability permeates much of the matrix, most of the factors are related to the desirability scale, each contributes some portion to the prediction, and no one variable contributes a disproportionate amount. In contrast the factor structure correlations are just that, estimated correlations of each variable with the factor. To the extent that the factors themselves are correlated, variables correlated substantially with one factor will tend also to be correlated with the associated factors.

Sample 2 (College Students)

The factor pattern coefficients and the correlations among the factors for the college student sample are presented in Tables 4 and 5. As before, discussion will be limited mostly to the large factors and those pertaining to the hypothesized factors.

Factor 2 is the most prominent factor in the matrix. It is a Poise-Sociability fusion with all of the subscales for the two hypothesized factors showing up substantially. As was the case in the other sample, the dominance marker, DoA, also appears.

Factor 3 is To, Tolerance of Human Nature. The subscale for tolerance of things, ToE, does not appear, but the other three tolerance markers, all interpersonal in nature, do. The factor is correlated significantly with sex.

TABLE 4

FACTOR PATTERN--COLLEGE SAMPLE

| Subscale | Factor | | | | | | | | | | | | | | | | | | | | | | $h^2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |
| 1 Ac (A) | | | | | | | | | | -39 | | | | | | | 39 | | | | | | 60 |
| 2 Ac (B) | | | | | | | -35 | | | | | | | 30 | | 38 | | | | | | | 56 |
| 3 Ac (C) | | | | | | | | | | | | | | | | 45 | | | | | | | 54 |
| 4 Al | | | | | | | | | | | | | | | | | 67 | | | | | | 40 |
| 5 Ag (A) | | | 36 | | | | | | | | 30 | | | | | | | | | | | | 46 |
| 6 Ag (E) | | 33 | | | | | | | | | | | | | -38 | | | | | | | | 52 |
| 7 Ag (D) | | | | | | | | | | | | | | | | | | | 55 | | | | 54 |
| 8 Au (A) | | | | | | | | | | | | | 54 | | | | | | | | | | 53 |
| 9 Au (B) | | | | | | | | | | -62 | | | | | | | | | | | | | 66 |
| 10 Ca (A) | | | | | | | | | | 97 | | | | | | | | | | | | | 77 |
| 11 Ca (B) | | | | | | | | | | | | | | | | | | | | | 34 | | 67 |
| 12 Ca (C) | 33 | | | | | | | | | | | | | | | | | | | | | | 53 |
| 13 Do (A) | | 70 | | | | | | | | | | | | | | | | | | | | | 58 |
| 14 Do (B | | | | | 40 | | | | | | | | | | | | | | | | | | 6[illegible] |
| 15 Do (C) | | | | | | | | | | | | | | | | | | | | | -39 | | [illegible]9 |
| 16 Es (A) | | | | | | | | | | | | | | | | | | | | | 51 | | 77 |
| 17 Es (B) | 30 | | | | | | | | | 48 | | | | | | | | | | | 30 | | 74 |
| 18 Es (C) | | | | | | | | | | | | | | 45 | | | | | | | | | 67 |
| 19 Es (D) | 45 | | | | | | | | | 30 | | 41 | | | | | | | | | | | 77 |
| 20 De (B) | | | | | | | | | | | | | | | | 82 | | | | | | | [illegible]4 |
| 21 De (C) | | | | | | | | | | | | | | | 42 | | | | | | 38 | | 7[illegible] |
| 22 De (-) | | | | | | | | | | | | | | | | 53 | | | | | | | 65 |
| 23 Em (A) | | | | | | | | | | | | | | | | | | | | | 86 | | 68 |
| 24 Em (B) | | -51 | | | | | | | | | | | | | | | | | | | | | [illegible] |
| 25 Em (C) | | | | | | | | | | | | | | | | | | | | | | -51 | 59 |
| 26 Gs (A) | | | | | | | | 70 | | | | | | | | | | | | | | | 70 |
| 27 Gs (C) | | | | | | | | 67 | | | | | | | | | | | | | | | 74 |
| 28 Mo (B) | | | | | | | | | | | | | | | | | | 69 | | | | | 67 |
| 29 Mo (A) | | | | | | | 37 | | | | | | | | | | | | | | | -36 | 69 |
| 30 Mo (C) | | | | | | | | | | | 35 | | | | | | | | | | | | 57 |
| 31 Pe (A) | | | | | | | | | | | | | | | | 63 | | | | | | | 64 |
| 32 Pe (C) | | | | 78 | | | | | | | | | | | | 37 | | | | | | | 83 |
| 33 Pe (B) | | | | | | | 46 | | | | | | | | | | | | | | | | 30 |
| 34 Me | | | | 81 | | | | | | | | | | | | | | | | | | | 58 |
| 35 Na (A) | | | | | | | | | | | | | | | | 48 | | 35 | | | | | 68 |
| 36 Na (B) | | | | | | | | | | | | | | | | | | | | | | -31 | 62 |
| 37 Na (C) | | | | | | | | | | | 72 | | | | | | | | | | | | [illegible] |
| 38 Ob (A) | | | | | | | | | | | | 66 | | | | | | | | | | | 58 |
| 39 Ob (B) | | | | | | | | | | | | 83 | | | | | | | | | | | 59 |
| 40 Ob (C) | | | | | | | | | | | | | | | | | | | 61 | | | | 64 |
| 41 Om (A) | | | | | | 60 | | | | | | | | | | | | | | | | | 43 |
| 42 Om (B) | | | | | | 71 | | | | | | | | | | | | | | | | | 53 |
| 43 Om (C) | | | | | | 32 | | | | | | | 30 | | | | | | | | | | 55 |
| 44 Po (A) | | 103 | | | | | | | | | | | | | | | | | | | | | 79 |
| 45 Po (B) | | 110 | | | | | | | | | | | | | | | | | | | | | 78 |
| 46 Po (C) | | 41 | | | | | | | | | | | | | | | | | | | | | 45 |
| 47 Se (A | | | | | | | | | | | | | | | | | | | | | | | 59 |
| 48 Se (C) | | | | | | | | | | | | | | | | | | 39 | | | | | 49 |
| 49 Ss (A) | | | | | | | | -75 | | | | | | | | | | | | | | | 69 |
| 50 Ss (B) | | | | | | | | | | | | | | | | | | | | | | 67 | 68 |
| 51 Ss (C) | | | | | | | | | | | | | | | | | | | | | | 71 | 61 |
| 52 Ss (D) | | | | | | | | -71 | | | | | | | | | | | | | | | 65 |
| 53 Re (A) | | | | | | | | | | 101 | | | | | | | | | | | | | 69 |
| 54 Re (B) | | | | | | | | | | | | | | | | | | | | | 102 | | 73 |
| 55 Co | | | | | | 30 | | | | | | | | 44 | | | | | | | | | 69 |
| 56 Rt (A) | | | | | | | | | 47 | | | | | | | | | | | | | | 57 |
| 57 Rt (B) | | | | | | | | | | | | | | | | | | | | | | | 64 |
| 58 Rt (C) | | | | | | | 48 | | | | | | | | | | | | | | | | 63 |
| 59 Sc (A) | | | | | | | | | | | | 42 | | | | | | | | | | | 78 |
| 60 Sc (B) | | | | | | | | | | | | 37 | | | | | | | | | | | 62 |
| 61 Sc (C) | | | | | | | | | | | | 37 | | | | | | | | | | | 63 |
| 62 Th (A) | | | | | 30 | | | | | | 31 | | | | | | | | | 40 | | | 61 |
| 63 Th (B) | | | | | 54 | | | | | | | | | | | | | | | | | | 41 |
| 64 Th (C) | | | | | 31 | | | | | -51 | | | | | | | | | | | | | 62 |
| 65 Th (D) | | | | | | | | | | | | | | | | | | | | | | | 45 |
| 66 To (A) | | | 45 | | | | | | | | | | | | | | | | | | | | 53 |
| 67 To (B) | | | 71 | | | | | | | | | | | | | | | | | | | | 50 |
| 68 To (C) | | | 59 | | | | | | | | | | | | | | | | | | | | 52 |
| 69 To (E) | | | | | | | | | | | | | | | | | | | | | 71 | | 52 |
| 70 So (A) | | 97 | | | | | | | | | | | | | | | | | | | | | 76 |
| 71 So (B) | | 74 | | | | | | | | | | | | | | | | | | | | | 67 |
| 72 So (C) | | 68 | | | | | | | | | | | | | | | | | | | | | 74 |
| 73 Su (A) | | 32 | | | | | | | | | | | | | -33 | | | | | | | | 58 |
| 74 Su (B) | | 39 | | | | | | | | | | | | | | | | | | | | | 55 |
| 75 Wb (A) | | | | | | | | | | 43 | | | | | | | | | | | | | 78 |
| 76 Wb (B) | 37 | | | | | | | | | 56 | | | | | | | | | | | | | 79 |
| 77 Wb (C) | | | | | | | | | | | | | | -36 | | | | | | | | | 80 |
| 78 Dy | 09 | 15 | 10 | 02 | 10 | 09 | -09 | -19 | -09 | 21 | 03 | 13 | -15 | 11 | 04 | 11 | 17 | 04 | 23 | 10 | 07 | -17 | |
| 79 Sex | 08 | -04 | 38 | 23 | -08 | -10 | -21 | 20 | -05 | 12 | 00 | -16 | -05 | 07 | -32 | 06 | -28 | -13 | -02 | -08 | -12 | 06 | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |

Note. Decimal points omitted; weights ≥ .30 listed.

TABLE 5

FACTOR CORRELATIONS: COLLEGE SAMPLE

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 100 | 24 | 01 | -05 | 06 | 07 | -06 | 00 | 00 | 04 | -03 | 24 | 13 | 13 | 10 | 15 | 05 | 14 | 00 | -07 | -02 | -15 |
| 2 | | 100 | 11 | -12 | -09 | 19 | -03 | 17 | -05 | 48 | 18 | 52 | -12 | 12 | -07 | 29 | 46 | 13 | -16 | -21 | 26 | -06 |
| 3 | | | 100 | -08 | -08 | 38 | 02 | 21 | -06 | 21 | 25 | 21 | 02 | -10 | -17 | -04 | -06 | 05 | 36 | 13 | 49 | 01 |
| 4 | | | | 100 | 14 | 01 | 18 | -11 | 19 | -01 | 19 | -09 | -15 | 09 | -03 | 30 | -01 | 28 | 04 | 08 | 10 | -30 |
| 5 | | | | | 100 | 03 | -09 | -22 | 10 | -11 | 21 | -02 | 04 | 09 | 06 | -01 | -16 | 00 | 03 | 09 | -10 | 10 |
| 6 | | | | | | 100 | -23 | -04 | 08 | 25 | 15 | 36 | 00 | 01 | -13 | 22 | 12 | 04 | 15 | -08 | 36 | 12 |
| 7 | | | | | | | 100 | -04 | -02 | 18 | 00 | -02 | -10 | 00 | 02 | 11 | 03 | 12 | -08 | 03 | 09 | -26 |
| 8 | | | | | | | | 100 | -18 | -08 | 12 | 01 | -01 | -07 | -24 | -13 | 17 | 00 | 20 | 03 | -03 | -22 |
| 9 | | | | | | | | | 100 | -02 | 06 | -01 | 04 | 12 | -01 | 12 | -09 | 04 | 07 | 08 | 09 | -01 |
| 10 | | | | | | | | | | 100 | 00 | 55 | -23 | -05 | -03 | 31 | 32 | 28 | -17 | -03 | 61 | -09 |
| 11 | | | | | | | | | | | 100 | 08 | 04 | 11 | -08 | 17 | 00 | 25 | 16 | 10 | 16 | -08 |
| 12 | | | | | | | | | | | | 100 | -12 | 00 | 03 | 28 | 41 | 13 | -06 | -20 | 43 | -02 |
| 13 | | | | | | | | | | | | | 100 | -06 | 03 | -10 | -13 | -19 | 00 | -09 | -21 | 05 |
| 14 | | | | | | | | | | | | | | 100 | -01 | 22 | 01 | 18 | 08 | 00 | -01 | 06 |
| 15 | | | | | | | | | | | | | | | 100 | -03 | -05 | -01 | -09 | -04 | -06 | -06 |
| 16 | | | | | | | | | | | | | | | | 100 | 24 | 32 | -05 | -11 | 25 | -13 |
| 17 | | | | | | | | | | | | | | | | | 100 | 00 | -25 | -22 | 15 | -08 |
| 18 | | | | | | | | | | | | | | | | | | 100 | 13 | 15 | 36 | -13 |
| 19 | | | | | | | | | | | | | | | | | | | 100 | 21 | 23 | 05 |
| 20 | | | | | | | | | | | | | | | | | | | | 100 | 13 | 03 |
| 21 | | | | | | | | | | | | | | | | | | | | | 100 | 05 |
| 22 | | | | | | | | | | | | | | | | | | | | | | 100 |

Note. Decimal points omitted.

Factor 4 is defined by the most meticulous of the persistence subscales (PeC) and by the sole meticulousness subscale. This is Meticulousness.

Factor 5 is Thoughtfulness but it is weak. Three of the four intended thoughtfulness markers appear but only one with a substantial pattern weight. That ThD does not appear is not surprising since the item analysis eliminated all but four of the items in the scale, three of which deal with liking to read. DoB describes a kind of intellectual dominance that would fit a "liking (or confidence with) thinking" interpretation.

Factor 6 is Open-Mindedness, with all of the hypothesized markers appearing.

Factor 7 has modest loadings on AcB, MoA, PeB, and RtC, and could be described as preference for the status quo vs. need for change. It does not correspond to any of the hypothesized factors.

Factor 8 is a composite of subscales for Gregariousness and the two subscales (SsA and SsD) reflecting Emotional Self-Sufficiency (negatively).

Factor 10 is a fairly complex factor comprised of scales reflecting aspects of manifest anxiety or nervousness, mostly physical manifestations. Although only one calmness subscale (CaA) appears, the other scales on the factor, particularly AuB and ReA, appear to relate to a kind of physically evident Calmness vs. Anxiety.

Factor 12 is a fusion of Objectivity and Self-Confidence with all of the markers intended for each appearing. The high scorer sees himself in a positive light and also feels that others see and treat him positively.

Factor 15 may be openness to feelings vs. shallow affect. The factor pattern coefficient (as well as the factor structure correlation, appendix B) appear to indicate that women report themselves more subject to emotional influences than do men.

Factor 16 is comprised of pairs of subscales for general activity (Ac), dependability (De), and persistence (Pe), plus a single need-for-achievement (Na) subscale. The positive end of the factor involves the motivation and tendency to do things well; the negative end, the lack of such motivation. It is too broad to identify with one single hypothesized factor.

Factor 17 is a small factor reflecting Alertness (Al).

Factor 18, defined by subscales for three traits (MoB, NaA, and SeC), is probably best described in terms of the first of them: moral, knows right from wrong, resists temptation vs. pleasure-seeking. A factor similar to this appeared in the preceding analysis.

Factor 21 includes scales for six different hypothesized traits. All of them reflect tolerance of frustration (mostly situational) vs. irritability. This looks like Emotional Maturity (Em).

Factor 22 is defined by two of the four intended self-sufficiency markers. This looks like individualism, unconventionality or nonconformity.

As was the case in the analysis of the Navy recruit sample, there are notably high correlations among a number of factors (Table 5). In the present analysis, as before, these correlations can be accounted for to a considerable extent by the correlations of the variables with the desirability scale (see appendix Table B for the factor structure correlations with the desirability scale).

Comparisons

Having considered the factor patterns separately for the two samples, it will be informative to compare the patterns across the two. To facilitate the comparisons, coefficients of congruence (Harman, 1967, pp. 269-271) were computed across the two factor patterns. No attempt was made to rotate to congruence; lack of congruence can be a function of a variety of causes, among them population differences (male Navy recruits vs. male and female college students), method of administration of the items (orally presented vs. printed), and various errors of measurement.

The strongest match across the two analyses is between Navy factor 2 and student factor 2. These factors both reflect a fusion of subscales for Sociability and Poise. The coefficient of congruence between these two factors is .87.

The next highest coefficient of congruence between factors in the two samples is .70. The pairing is between Navy factor 1 and student factor 10. For the Navy sample the factor looks like the second-order Neuroticism factor often found; for the student sample it is more specific: physically evident Calmness (Ca) vs. Anxiety. The broad Navy factor 1 was also somewhat congruent (coefficient of congruence = .41) with student factor 21, "tolerant of frustration vs. irritable," interpreted as Emotional Maturity (Em).

There is a good match between the two factors reflecting Emotional Self-Sufficiency (coefficient of congruence = .64). In the college sample (factor 8) the emotional self-sufficiency subscales (SsA and SsD) appear along with subscales for gregariousness, a fact that accounts for the co-

efficient of congruence of .50 with the Gregariousness factor (12) in the Navy sample. As noted, however, the greater congruence is with the Emotional Self-Sufficiency factor (factor 3).

Navy factor 21 and college factor 16 are moderately congruent (.61). General activity, persistence, and achievement motivation are common to the two factors. Although Navy factor 21 was left unlabeled, perhaps both factors fit the description used in the college sample: "motivation and tendency to do things well vs. lack of such motivation."

The subscales reflecting individualistic aspects of Self-Sufficiency (SsB, SsC) appear on Navy factor 5 and student factor 22. The two small factors are moderately congruent (.57), in both instances being interpreted as individualism, unconventionality, or nonconformity.

Navy factor 9 and student factor 18 share only their single large loading, MoB, "moral, knows right from wrong vs. pleasure-seeking." The two are moderately congruent (.56), a fact that strengthens their shared interpretation.

Factor 8 in the Navy recruit sample and factor 12 in the college student sample are both marked by Self-Confidence indicators. Objectivity subscales have sizable weights on the latter factor whereas the Navy factor is marked only by Self-Confidence markers. The coefficient is .54.

Navy factor 16 and student factor 6 (coefficient of congruence = .53) are both characterized as Open-Mindedness (Om). Factor 6 is limited to open-mindedness subscales but factor 16 includes, in addition, subscales for several other traits, the most pronounced being ToA, "believes people

are capable of good work vs. critical, fault-finding." It is not surprising, then, that there is some congruence (.41) between the latter factor (Navy factor 16) and student factor 3, Tolerance of Human Nature (To).

## Conclusions

The factor analyses of the responses of the two samples have provided clear evidence in both samples for factors of Self-Confidence (Sc) and Open-Mindedness (Om). Self-Sufficiency (Ss) split in both analyses into distinct factors describable as Individualism vs. Conformity and Emotional Self-Sufficiency. Gregariousness (Gs) subscales formed a distinct factor in one analysis but fused with emotional self-sufficiency in the other. Social Poise (Po) and Sociability (So) fused to form a single factor in each analysis. In each sample, moral vs. pleasure-seeking (MoB) teamed with a few other subscales (different in the two samples) to form a small factor, but no clear morality factor appeared. Factors interpreted as Calmness (Ca) and Emotional Maturity (Em) appeared in the college student sample but fused into a broad Neuroticism factor in the Navy sample. A broad factor with Ac, Pe, and Na variables appeared in each analysis, though it was broader in the Navy analysis. Neither factor was close enough to a single one of the 28 putative factors to be said to replicate it. Both have some characteristics of Cattell's superego strength. Tolerance of Human Nature (To) appears clearly in the college sample, losing its "tolerance of things" aspect. Again in the student sample, the sole meticulousness subscale paired with the most meticulous of the persistence subscales to form a clear Meticulousness (Me) factor. Alert-

ness, another one-variable scale, appeared as a factor in the college sample. Thoughtfulness (Th) factors appear in both analyses but are somewhat differently constituted in the two, not being particularly clear in either.

Of the 28 putative factors, ten have been verified reasonably clearly in the present analyses. These are, in approximate order of certainty, Sc, Om, Ss (emotional), Gs, To, Me, Ca, Em, Th, and Al. If a minimum of three indicators be required to define a factor and if a certain amount of reassignment of subscales is permitted, sufficient markers for the following can be provided: Om, Sc, Th, To, Ca, and Em. In addition, there are three markers for Individualism vs. Conformity which, upon reexamination of the literature, seems to be reflected as distinct from Emotional Self-Sufficiency.

The relative sparsity of clear replications of the 28 putative factors may be partly a function of some constraints on our analyses. It was decided in the early stages, but after the items had been written and administered, that it would be impractical to conduct factor analyses on a matrix as large as 174 by 174 (87 subscales x 2 poles), especially given the relatively small sample sizes. Yet the subfactors had been defined by French with just such an approach in mind. He saw the poles as separate entities, sometimes having a very clear notion (and evidence for) the nature of one pole but only an educated guess as to the nature of the contrasting pole. In the item analyses scores were summed across the two poles and items retained or discarded on the basis of their correlations with the composite. Subscales were, in turn, retained or discarded as a

function of their homogeneities across the total of both poles. It is likely that these procedures diluted or contaminated some potential markers where one pole was on target but the other not. Some of the fusions across two or more putative factors as well as some of the "misplacements" of intended markers may have this explanation. Some attempt to deal with this problem by keeping poles separate in factor analyses is reported separately (French & Dermen, 1974).

There are, of course, a number of sources of error in addition to that just described. The determination of the nature of a factor is a subjective one, the decision that factors found in different studies, usually using different items, are the same is also subjective. When items are written to fit the descriptions another fallible step is interposed between the results of others and the new factor analytic results. Sample differences, differences in mode of administration of the items and in dealing with response style problems are additional sources of inconsistency of results.

In view of the several hurdles faced in the present analyses, the positive results are particularly encouraging. The negative findings are not sufficient evidence to reject the conclusions of the literature review (French, 1973). The results of the present study must be integrated with these broader findings. The analyses separately by poles (French and Dermen, 1974), the present results, and an updated literature review will be integrated for the recommendations in the final product of this project, the Guide to Self-Report Temperament Factors, that is in preparation.

References

French, J. W. Toward the establishment of noncognitive factors through literature search and interpretation (ETS PR 73-29). Princeton, N. J.: Educational Testing Service, 1973.

French, J. W. and Dermen, D. Seeking markers for temperament factors among positive and negative poles of temperament scales (ETS PR 74-22). Princeton, N. J.: Educational Testing Service, 1974.

Goldberg, L. R. Parameters of personality inventory construction and utilization: A comparison of prediction strategies and tactics. Multivariate Behavioral Research Monographs, 1972, MBR Monograph No. 72-2.

Harman, H. H. Modern factor analysis (2nd ed.). Chicago: University of Chicago Press, 1967.

Jackson, D. N. Personality Research Form (Form AA). Goshen, N. Y.: Research Psychologists Press, 1965.

TABLE A

FACTOR STRUCTURE--NAVY SAMPLE

| Subscale | Factor | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 1 Ac(A) | | | | | | | | | | | | | | | | | | | | | 65 | |
| 2 Ac(B) | 44 | 39 | | | | | | | | | | | | 32 | | 30 | | | | | 67 | |
| 3 Ac(C) | 52 | 34 | | | | 32 | | | 30 | | | | | | | 47 | | | | | 83 | |
| 4 Al | 57 | 35 | | | | | | | 31 | | | | | | | 42 | | | | | 55 | |
| 5 Ag(A) | | 37 | | | -42 | | | | | | | 46 | | | | | | | 34 | | 39 | 43 |
| 6 Ag(E) | 41 | 51 | | | -37 | | | | | | | 40 | | 36 | | 41 | | | | -30 | 46 | |
| 7 Ag(D) | | | | | | | -35 | | | 42 | | | | | | 53 | | | | | | |
| 8 Au(A) | -58 | | | | 32 | | | | -43 | -35 | | | | | | | | | | | -42 | |
| 9 Au(B) | -86 | -34 | -35 | | | -30 | | -37 | -32 | | | | | -39 | | -36 | | | | | -37 | |
| 10 Ca(A) | 80 | 37 | | | | | | | | | | | | 41 | | | | | | | 35 | |
| 11 Ca(B) | 76 | 31 | | | | | -35 | | | | | | | | | | | | | | 49 | |
| 12 Ca(C) | 51 | | | | | | | 32 | | 54 | | | | | | 31 | | | | | 36 | |
| 13 Do(A) | | 61 | | | | | | | | | -31 | | 37 | | | | | | | | 38 | |
| 14 Do(B) | | 52 | | | | | | | | | | | 75 | | | | | | | | | |
| 15 Do(C) | | | | | | | 96 | | | | | | | | | | | | | | | |
| 16 Es(A) | 84 | 30 | | | | | | | | | | | | | | 35 | | | | | 43 | |
| 17 Es(B) | 64 | | | | | | | 37 | | | | | | | | 50 | | | | | 58 | |
| 18 Es(C) | 66 | 35 | | | | 30 | | | | | | | | 38 | | 54 | | -31 | | | 62 | |
| 19 Es(D) | 63 | | | | | | | 39 | | | | | | 46 | | 59 | | | | | 58 | |
| 20 De(B) | 62 | | | | -34 | | | | 43 | | | | | | | 35 | | | | | 57 | 35 |
| 21 De(C) | 70 | | | | | | -31 | | | | | | | | | 31 | | | | | 39 | |
| 22 De(-) | 60 | | | | -39 | 35 | | | 45 | | | | | | | 37 | | | | | 64 | 32 |
| 23 Em(A) | 65 | | | | | 35 | -48 | | | 30 | | | | | | 47 | | | | | 43 | |
| 24 Em(B) | | -41 | | | | | | | | | 93 | | | | | | | | | | | |
| 25 Em(C) | 47 | | | | | 30 | -40 | | 33 | | | | | | | 64 | | | | | 53 | |
| 26 Gs(A) | | 44 | -30 | | -42 | | | | | | | 67 | | | | | | | | | | |
| 27 Gs(C) | | 38 | -34 | | | | | | | | | 81 | | | | | | | | | | |
| 28 Mo(B) | 40 | | | | | | | | 92 | | | | | | | | | | | | 53 | |
| 29 Mo(A) | | | | | -30 | | | | | | | | | | | | 57 | | | | 54 | |
| 30 Mo(C) | 36 | | | | | | | | | | | | | | | 45 | | | 74 | | 41 | |
| 31 Fe(A) | 42 | | | | | | | | 31 | 37 | | | | | | 36 | | | | | 77 | |
| 32 Fe(C) | 41 | | | | | | | | 32 | | | | | | | 36 | | | | | 76 | |
| 33 Fe(B) | | | | | | | | | | | | | | | | | | | | 97 | | |
| 34 Me | 49 | | | | -31 | | | | | | | | | | | 49 | | | | | 67 | |
| 35 Na(A) | 44 | 31 | | | -38 | | | | 39 | | | | | | | | | | | | 73 | |
| 36 Na(B) | 33 | 45 | | | | | | | | | | 36 | | | | | | | | | 64 | |
| 37 Na(C) | 41 | 39 | | 35 | -42 | 32 | | | 42 | | | | | | | 33 | | 46 | | | 57 | |
| 38 Ob(A) | 47 | | | | | | -58 | | | | | 30 | | 34 | | 45 | 35 | | | | 48 | |
| 39 Ob(B) | 50 | | | | | | -40 | 42 | | | | | | 38 | | 45 | | | | | 44 | |
| 40 Ob(C) | 36 | | -35 | | | | -46 | | | | | 48 | | | | 46 | | | | | 45 | |
| 41 Om(A) | | | | | | | | | | | | | | | | 83 | | | | | 30 | |
| 42 Om(B) | 32 | | | | | | | | | | | | | | | 81 | | | | | 31 | |
| 43 Om(C) | 43 | | | | | | | | | | | | 30 | | | 62 | | | | | 37 | |
| 44 Po(A) | 32 | 87 | | | | | | | | | | 31 | | | | | | | | | | |
| 45 Po(B) | 33 | 81 | | | | 33 | | | | | | | | | | | | | | | 31 | |
| 46 Po(C) | | 55 | | | | | | | | | | | | | | 34 | | | | | 32 | |
| 47 Se(A) | 42 | | | | | | | | | | | | | | | 56 | | | | | 39 | 38 |
| 48 Se(C) | | | | | | 32 | -33 | | 37 | | | | | | | | | | | | | 32 |
| 49 Ss(A) | | | 89 | | | | | | | | | -33 | | | | | | | | | | |
| 50 Ss(B) | | | 32 | | 93 | | | | | | | | | | | | | | | | | |
| 51 Ss(C) | | | | | 47 | | | | | | | | | | | | | | | | | |
| 52 Ss(D) | | | 23 | | | | | | | | | | | | | | | | | | | |
| 53 Re(A) | 75 | 36 | | | | | | | | | 31 | 37 | | | | 32 | | | | | | |
| 54 Re(B) | 61 | | | | | | -56 | | | | | | 45 | | | 38 | | | | | 40 | |
| 55 Co | 63 | 41 | | 38 | | 44 | | | 38 | 33 | | | | | | | | | | | 50 | |
| 56 Ft(A) | 44 | | | | | 38 | | | 50 | | | | 33 | | | | | -34 | | | 33 | |
| 57 Ft(B) | | | | 55 | | 32 | | | 42 | | | | | | | | | | | | 36 | 30 |
| 58 Ft(C) | | | | | -30 | 37 | | | 56 | 42 | | | | | | | | | | | 32 | |
| 59 Sc(A) | 63 | 52 | | | | | | 68 | | | | | | | | 44 | | | | | 49 | |
| 60 Sc(B) | 57 | 34 | | | | | | 74 | | | | | | | | 49 | | | | | 50 | |
| 61 Sc(C) | 53 | 48 | | | -35 | | -37 | 61 | | | | | | | | 42 | | | | | 40 | |
| 62 Th(A) | | | | 46 | | 35 | -43 | | | | | | 32 | | | 52 | | | | -30 | | |
| 63 Th(B) | 31 | 35 | | 34 | | 47 | | | | | | | | | | 32 | | | | | 37 | |
| 64 Th(C) | | | | 98 | | | | | | | | | | | | | | | | | | |
| 65 Th(D) | | | | | | 97 | | | | | | | | | | | | | | | | |
| 66 To(A) | | | | | | | | | | 81 | | | | | | | | | | | | |
| 67 To(B) | 32 | | | | | | -30 | | | 34 | | | | | | 41 | 34 | | | | 31 | |
| 68 To(C) | 32 | | | | | | | | | 30 | | | | | | 66 | | | | | 42 | 56 |
| 69 To(E) | 45 | | | | | | -40 | | | 31 | | | | | | 37 | | | | | 34 | 30 |
| 70 So(A) | | 78 | | | | | | | | 33 | | | | 32 | | | | | | | | |
| 71 So(B) | | 73 | | | -35 | | | | | | | | | 46 | | | | | | | 41 | |
| 72 So(C) | 41 | 83 | | | -33 | | | | | | | 33 | | 32 | | | | | | | 44 | |
| 73 Su(A) | 35 | 48 | | | | | | | | | | | | 85 | | 36 | | | | | | |
| 74 Su(B) | | 35 | | | | | | | | | | 30 | | | 92 | | | | | | | |
| 75 Wk(A) | 74 | 43 | | | -37 | | -31 | 38 | | 30 | | 40 | | | | 55 | | | | | 59 | |
| 76 Wk(B) | 71 | 47 | | | | | -33 | 36 | | 38 | | 30 | | | | 62 | | | | | 63 | |
| 77 Wk(C) | 74 | 38 | | | | | | 36 | | | | | | | | 42 | | | | | 46 | |
| 78 Dg | 70 | 41 | 00 | 18 | -24 | 23 | -37 | 34 | 23 | 33 | 05 | 26 | 20 | 35 | -02 | 62 | 07 | -01 | 04 | -28 | 63 | 10 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |

Note. Decimal points omitted; loadings $\geq .30$ listed.

TABLE 8

FACTOR STRUCTURE--COLLEGE SAMPLE

| Subscale | Factor | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 1 Ac(A) | 34 | | | | | | | | | | | 30 | | 36 | | 31 | 46 | | | | | |
| 2 Ac(B) | | 37 | | | | | -30 | | | | | | | 38 | | 45 | | | | | | |
| 3 Ac(C) | | | | 30 | | 33 | | | | | | 32 | | | | 61 | | | | | | |
| 4 Al | | | | | | | | | | | | | | | | | 59 | | | | | |
| 5 Aq(A) | | | 47 | | | | | 30 | | | 41 | | | | | | | | | | | |
| 6 Aq(E) | | 43 | | | | | | 37 | | | | | | | -48 | | 33 | | | | | |
| 7 Aq(D) | | | 44 | | | 39 | | | | | | | | | | | | | 59 | | 35 | |
| 8 Au(A) | | | | | | | | | | | | | 57 | | | -43 | | | | | | |
| 9 Au(B) | | -37 | | | | | | | | -72 | | -49 | | | | -34 | | | | | -50 | |
| 10 Ca(A) | | 32 | | | | | | | | 85 | | 42 | | | | | | | | | 47 | |
| 11 Ca(B) | | | | | | | | | | 59 | | 34 | -37 | | | 33 | | 44 | | | 58 | |
| 12 Ca(C) | 40 | 34 | | | | | | | | 41 | | 37 | | | | | | | | | | |
| 13 Do(A) | | 67 | | | | | | | | | | 34 | | | | | 33 | | -32 | | | |
| 14 Do(B) | | 38 | -32 | | 38 | | | | | | | | | | | | 35 | | | -35 | | |
| 15 Do(C) | | | -45 | | | | | | | | | | | | | | | -30 | -37 | -41 | -49 | |
| 16 Es(A) | | 37 | | | | | | | | 68 | | 50 | | | | | 33 | 41 | | | 65 | |
| 17 Es(B) | 33 | 47 | | | | | | | | 74 | | 57 | | | | 38 | 32 | | | | 60 | |
| 18 Es(C) | | 37 | | | | | | | | 46 | | 48 | | 46 | | 38 | 41 | | | | 39 | |
| 19 Es(D) | 54 | 49 | | | | | | | | 59 | | 68 | | | | 34 | 31 | | | | 42 | |
| 20 De(B) | | | | 35 | | | | | | | | | | | | 71 | | | | | | |
| 21 De(C) | | | | | | | | | | 53 | | 36 | -36 | | 41 | | | | | | 51 | |
| 22 De(-) | | | | 39 | | | | | | | 33 | | | | | 65 | | 52 | | | 30 | |
| 23 Em(A) | | | 35 | | | | | | | 47 | | | | | | | | 32 | | | 78 | |
| 24 Em(B) | -31 | -41 | | | | | | | | | | | | | | | | | | | 36 | |
| 25 Em(C) | | | | | | | 32 | | | | | | | | | | | 34 | | | | -60 |
| 26 Gs(A) | | 41 | | | | | | 73 | | | | | | | | | 35 | | | | | |
| 27 Gs(C) | | 41 | | | | | | 74 | | | | | | | | | 31 | | | | | |
| 28 Mo(B) | | | | 30 | | | | | | | | | | | | 41 | | 74 | | | | |
| 29 Mo(A) | | | | 38 | | | 52 | | | | | | | | | | | 38 | | | | -55 |
| 30 Mo(C) | | | 48 | | | | | | | | 41 | | | | | | | 32 | | | 49 | |
| 31 Pe(A) | | | | 32 | | | | | | | | | | | | 73 | | 33 | | | | |
| 32 Pe(C) | | | | 82 | | | | | | | | | | | | 56 | | 30 | | | | |
| 33 Pe(B) | | | | | | | 51 | | | | | | | | | | | | | | | |
| 34 Me | | | | 72 | | | | | | | | | | | | | | | | | | |
| 35 Na(A) | | | | 31 | | | | | | | | | | | | 67 | | 53 | | | | |
| 36 Na(B) | | 38 | | | | | | | | | | 30 | | | | | 42 | | -45 | | | -33 |
| 37 Na(C) | | | | | | | | | | | 68 | | | | | | | | | | | |
| 38 Ob(A) | | | 32 | | | | | | | 45 | | 66 | | | | | | | | | 44 | |
| 39 Ob(B) | | | | | | 31 | | | | | | 70 | | | | | | | | | 32 | |
| 40 Ob(C) | | | 31 | | | | | 42 | | | 31 | 33 | | | | | | | 58 | | | |
| 41 Om(A) | | | | | | 57 | | | | | | | | | | | | | | | | |
| 42 Om(B) | | | 33 | | | 69 | | | | | | | | | | | | | | | | |
| 43 Om(C) | | | | | | 49 | -34 | | | | | | 33 | | | | | | | | | |
| 44 Po(A) | 33 | 81 | | | | | | | | | | | | | | | | | | | | |
| 45 Po(B) | | 80 | | | | | | | | | | | | | | | | | | | | |
| 46 Po(C) | | 55 | | | | | | | | 30 | | 42 | | | | | 33 | | | | | |
| 47 Se(A) | | | 46 | | -31 | 38 | | | | 40 | | 33 | | | | | | 30 | | | 48 | |
| 48 Se(C) | | | | | | | | | | | | | | | | | | 49 | | | | |
| 49 Ss(A) | | | | | | | | -72 | | | | | | | | | | | | | | |
| 50 Ss(B) | | | | | | | | -39 | | | | | | | | | | | | | | 74 |
| 51 Ss(C) | | | | | | | | | | | | | | | | | | | | | | 69 |
| 52 Ss(D) | | | | | | | | -64 | | 31 | | | | | | | | | | | | |
| 53 Re(A) | | | | | | | | | | 76 | | | | | | | | | | | 42 | |
| 54 Re(B) | | | 36 | | | 31 | | | | 44 | | 40 | | | | | | | | | 78 | |
| 55 Co | | | | 31 | | 35 | | | | 38 | | | | 51 | | 53 | | 32 | | | | |
| 56 Rt(A) | | | | 44 | | | | | 52 | | | | | | | | | | | | | -30 |
| 57 Rt(B) | | | | 45 | 33 | | | | 33 | | 38 | | | | | | | 39 | | 30 | | |
| 58 Rt(C) | | | | | | | 54 | | 34 | | | | | | | | | | | | | |
| 59 Sc(A) | | 57 | | | | | | | | 63 | | 70 | | | | 43 | 45 | | | | 38 | |
| 60 Sc(B) | | 51 | | | | 30 | | | | 52 | | 62 | | | | 40 | 43 | | | | -31 | |
| 61 Sc(C) | | 53 | | | | 31 | | | | 52 | | 61 | | | | | 44 | | | | 43 | |
| 62 Th(A) | | | | | 45 | | | | | | 45 | | | | | | | | | 44 | | |
| 63 Th(B) | | | | | 52 | | | | | | | | | | | | | | | | | |
| 64 Th(C) | | -31 | | | 44 | | | | | -55 | 32 | -33 | | | | | | | | | | |
| 65 Th(D) | | | | | 32 | | | | | | | | | 31 | | | -31 | | | | | 30 |
| 66 To(A) | | | 60 | | | 41 | | | | | | 30 | | | | | | | 39 | | 38 | |
| 67 To(B) | | | 65 | | | 31 | | | | | | | | | | | | | | | 33 | |
| 68 To(C) | | | 65 | | | 32 | | | | | | | | | | | | | | | 37 | |
| 69 To(E) | | | | | | | | | 30 | 33 | | | | | | | | | | | 65 | |
| 70 So(A) | | 83 | | | | | | | | 32 | | 35 | | | | | 30 | | | | | |
| 71 So(B) | | 72 | | | | | | 36 | | 30 | | | | | | | 44 | | | | | |
| 72 So(C) | | 71 | | | | | | | | 49 | | 44 | -31 | | -32 | | 46 | | | | 34 | |
| 73 Su(A) | | 53 | | | | | | 44 | | | | 33 | | | -41 | | 31 | | | | | |
| 74 Su(B) | | 50 | | | -33 | | | 43 | | | | | | | | | 43 | | | | | |
| 75 Wb(A) | | 51 | | | | | | | | 74 | | 63 | | | | 31 | 45 | | | | 48 | |
| 76 Wb(B) | 42 | 53 | 31 | | | 31 | | | | 73 | | 60 | | | | 34 | | | | | 56 | |
| 77 Wb(C) | | 53 | | | | 33 | | | | 66 | | 64 | | | | 33 | 35 | | | | 49 | |
| 78 Dy | 23 | 45 | 29 | 13 | 08 | 37 | -01 | -08 | -01 | 53 | 20 | 52 | -29 | 18 | 01 | 40 | 32 | 33 | 17 | 05 | 51 | -15 |
| 79 Sex | -02 | -10 | 34 | 10 | -07 | 04 | -17 | 28 | -06 | -14 | 08 | -22 | 02 | 02 | -41 | -07 | -27 | -08 | 20 | 05 | -02 | 01 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |

Note. Decimal points omitted; loadings $\geq$ .30 listed.

TABLE C

COEFFICIENT ALPHA RELIABILITIES: ORIGINAL AND REVISED SCALES
(NAVY SAMPLE)

| Subscale | Original | | Revised[1] | | Subscale | Original | | Revised[1] | |
|---|---|---|---|---|---|---|---|---|---|
| | No. of Items | Alpha | No. of Items | Alpha | | No. of Items | Alpha | No. of Items | Alp |
| 1 AcA | 16 | .51 | 12 | .59 | 41 OmA | 16 | .64 | 14 | .6 |
| 2 AcB | 16 | .62 | 14 | .55 | 42 OmB | 16 | .49 | 8 | .5 |
| 3 AcC | 16 | .55 | 14 | .56 | 43 OmC | 16 | .48 | 8 | .5 |
| 5 AgA | 12 | .31 | 6 | .36 | 31 PeA | 16 | .69 | 14 | .6 |
| X AgB | 12 | .30 | -- | --- | 33 PeB | 16 | .41 | 6 | .3 |
| X AgC | 12 | .28 | -- | --- | 32 PeC | 16 | .52 | 8 | .5 |
| 7 AgD | 12 | .48 | 6 | .41 | 44 PoA | 16 | .73 | 14 | .7 |
| 6 AgE | 12 | .41 | 8 | .53 | 45 PoB | 16 | .76 | 16 | .7 |
| 4 Al | 16 | .57 | 10 | .60 | 46 PoC | 16 | .40 | 6 | .3 |
| 8 AuA | 16 | .63 | 12 | .62 | 53 ReA | 16 | .66 | 14 | .7 |
| 9 AuB | 16 | .69 | 14 | .69 | 54 ReB | 16 | .55 | 6 | .5 |
| X AuC | 16 | .38 | (6) | (.32) | 56 RtA | 16 | .35 | 6 | .5 |
| 10 CaA | 16 | .76 | 14 | .77 | 57 RtB | 16 | .45 | 10 | .4 |
| 11 CaB | 16 | .68 | 14 | .65 | 58 RtC | 16 | .49 | 10 | .5 |
| 12 CaC | 16 | .59 | 8 | .65 | 59 ScA | 16 | .63 | 12 | .6 |
| 55 Co | 16 | .68 | 14 | .71 | 60 ScB | 16 | .70 | 14 | .7 |
| X DeA | 12 | .19 | -- | --- | 61 ScC | 16 | .72 | 12 | .7 |
| 20 DeB | 12 | .62 | 10 | .62 | 47 SeA | 16 | .44 | 6 | .4 |
| 21 DeC | 12 | .58 | 10 | .53 | X SeB | 16 | .25 | (4) | (.1 |
| 22 DeD | 12 | .62 | 12 | .55 | 48 SeC | 16 | .39 | 6 | .5 |
| X DeE | 12 | .31 | (4) | (.20) | X SeD | 16 | .34 | (6) | (.3 |
| 13 DoA | 16 | .37 | 8 | .62 | 70 SoA | 16 | .65 | 10 | .6 |
| 14 DoB | 16 | .51 | 12 | .50 | 71 SoB | 16 | .63 | 16 | .6 |
| 15 DoC | 16 | .52 | 14 | .52 | 72 SoC | 16 | .73 | 10 | .7 |
| 23 EmA | 16 | .50 | 8 | .55 | 49 SsA | 16 | .61 | 14 | .6 |
| 24 EmB | 16 | .51 | 12 | .62 | 50 SsB | 16 | .53 | 12 | .5 |
| 25 EmC | 16 | .56 | 8 | .58 | 51 SsC | 16 | .50 | 6 | .3 |
| 16 EsA | 16 | .74 | 12 | .68 | 52 SsD | 16 | .55 | 14 | .5 |
| 17 EsB | 16 | .54 | 12 | .59 | 73 SuA | 16 | .49 | 10 | .5 |
| 18 EsC | 16 | .78 | 14 | .76 | 74 SuB | 16 | .46 | 8 | .4 |
| 19 EsD | 16 | .78 | 16 | .79 | X SuC | 16 | .32 | (4) | (.3 |
| 26 GsA | 16 | .71 | 16 | .69 | 62 ThA | 16 | .53 | 14 | .6 |
| X GsB | 16 | .21 | -- | --- | 63 ThB | 16 | .64 | 10 | .6 |
| 27 GsC | 16 | .66 | 12 | .65 | 64 ThC | 16 | .56 | 12 | .5 |
| 34 Me | 16 | .68 | 12 | .69 | 65 ThD | 16 | .31 | 4 | .5 |
| 29 MoA | 16 | .56 | 10 | .52 | 66 ToA | 12 | .42 | 4 | .4 |
| 28 MoB | 16 | .57 | 12 | .52 | 67 ToB | 12 | .47 | 6 | .3 |
| 30 MoC | 16 | .42 | 6 | .40 | 68 ToC | 12 | .39 | 6 | .4 |
| 35 NaA | 16 | .62 | 12 | .63 | X ToD | 12 | .39 | (4) | (.2 |
| 36 NaB | 16 | .63 | 12 | .63 | 69 ToE | 12 | .49 | 8 | .5 |
| 37 NaC | 16 | .64 | 14 | .68 | 75 WbA | 16 | .75 | 14 | .7 |
| 38 ObA | 16 | .67 | 10 | .59 | 76 WbB | 16 | .70 | 12 | .6 |
| 39 ObB | 16 | .79 | 12 | .77 | 77 WbC | 16 | .65 | 12 | .5 |
| 40 ObC | 16 | .56 | 10 | .57 | | | | | |

[1]Scales indicated with "--" were eliminated in initial item analysis. Those with alpha values in parentheses were eliminated because they were still unreliable after revision.

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